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COMPLETE SPECIFICATION

Silk-screen Printing Machine

We, THE ARGON SERVICE LTD., an Italian Company, of Via Malpighi 4, Milan, Italy, do hereby declare the invention for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to silk screen printing machines.

10 Manual silk screen printing machines consist essentially of a screen hinged to a printing table (i.e., a member on which material to be printed may be laid) and a squeegee which may be moved across the screen forcing ink therethrough onto material on the printing table. The screen consists of a frame provided with a screen proper of some material (usually silk) having regular meshes. A stencil is secured to the screen so as to leave open only those meshes of the screen which correspond to the matter which is to be reproduced. In such machines sheets are printed by placing one sheet at a time under the screen and by replacing each printed sheet with a fresh one to be printed. Since care must be taken to bring each sheet into correct register before it is printed, this method involves a considerable waste of time.

30 It is the object of the invention to provide a machine in which silk screen printing may be effected more rapidly than hitherto, the machine being so constructed that it is unnecessary to insert each sheet to be printed separately into the machine.

According to the invention there is provided a silk screen printing machine comprising a printing table, screen-support means mounted above said table; a screen carried by said screen-support means and mounted for angular movement towards and away from said table, and means operated upon angular movement of the screen, for moving the screen-support means and table relatively towards each other through a pre-

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determined distance.

Preferably the machine also comprises a device adapted to support a part of the screen remote from a portion or portions thereof which is or are supported by the screen-support means, the device being adapted to effect movement of the said part and the table relatively towards each other, through the said predetermined distance, upon movement of a squeegee carrying member across said screen. The said device may comprise a screw adapted to be supported by and to upstand from the printing table when the screen is in its lowest angular position, a rotatable member carried by a screen support and threaded onto the screw, and means, actuated by movement of the squeegee-carrying member, for rotating the rotatable member in one direction only.

The screen-support means preferably comprises a shaft whose ends are journaled in bearings between which and the table the said relative movement may be effected, a portion or portions of said screen being connected to the said shaft, whereby angular movement of the screen may be effected by rotating the shaft in its bearings. Each bearing is preferably carried by a rotatable member threaded onto a screw supported by and upstanding from a support upon which the table is mounted, there being provided a pawl carried by a pivotally mounted lever, a driving connection between the shaft and the lever effecting pivotal movement of the latter upon rotation of the shaft, a rotatably mounted ratchet wheel in engagement with the pawl, and means for transmitting motion from the ratchet wheel to the rotatable member, whereby the latter is lowered towards the support upon rotation of the shaft in one angular direction only.

The invention is illustrated, by way of example, in the accompanying drawings, in which:—

Fig. 1 is a perspective view of a machine

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according to the invention;

Fig. 2 is a sectional elevation of means for aligning sheets of material on the printing table of the machine of Fig. 1;

5 Figs. 3 and 4 are respectively an elevation and a plan of part of the machine of Fig. 1; and

Figs. 5 and 6 are respectively an elevation and a plan of another part of the machine of 10 Fig. 1.

Referring to the drawings, a manual silk-screen printing machine essentially comprises a supporting table 1 on which is mounted a movable printing table 2. The printing 15 table 2 is adapted to carry a ream 3 of sheets of paper or other material to be printed. The ends of a shaft 6 are journaled in bearings 9 each of which can slide vertically on upstanding studs 10, 11 secured to a plate 20 12 fixed to the supporting table 1 (see Fig. 3). Mounted upon the shaft 6 and adjustably secured thereto (by means not shown) are a pair of sleeves 7. Each sleeve 7 is formed with a three-armed spider the arms 7' of 25 which support a screen frame 4 carrying a stencil 5. Arms 7'' of the spider are interconnected by a bar 7''' adapted to co-operate with an arm 14 of a driving lever 13 carrying a squeegee 15, the lever 13 being mounted 30 on a carriage 13' which is rotatably and slidably mounted on the shaft 6. Hence sliding movement of the carriage 13' along the shaft 6 effects movement of the squeegee 15 over the stencil 5, while a rearward pull on the 35 arm 14 will raise the frame 4 by engagement of the arm 14 with the bar 7'''. The screen 4 is biased towards the raised position by counterweights 8, 8' carried by arms 7'''' of the said spiders.

40 Collars 16 (see Fig. 3) are secured to the ends of the shaft 6 adjacent each bearing 9. Each collar 16 is provided with a radially extending arm 17 the outer end of which is disposed between the prongs of a fork 18 dis- 45 posed at the end of one arm of a two-armed lever 19 which is rotatably mounted upon an upstanding shaft 22 journaled in the bearing 9. Pivotaly mounted at the end of the other arm of the lever 19 is a pawl 20 engaging 50 with the teeth of a ratchet wheel 21 mounted on the shaft 22. Also mounted on the shaft 22 is a gear wheel 23 which meshes with a gear wheel 24. The gear wheel 24 is mounted upon a sleeve 24' rotatably mounted in the 55 bearing 9. Threaded into the sleeve 24' is a screw 25. The screw 25 can be rotated about its axis, without any axial displacement, by means of a crank 26, but during the printing operation the screw 25 is locked in a 60 fixed position by a locking screw 27 to a cross arm 28 mounted upon and extending between the studs 10, 11. It will thus be appreciated that the bearings 9, and hence the screen frame 4, may be raised and 65 lowered so as to effect corresponding raising

or lowering of the arms 7' either by unlocking the screw 27 and rotating the crank 26, whereby the sleeve 24' is raised or lowered, or by pulling rearwardly on the arm 14, whereby the sleeves 7 and hence the shaft 6 70 are rotated. Rotation of the shaft 6 effects rotation of the arm 17 and hence movement of the lever 19. This movement is transmitted to the shaft 22 by way of the pawl 20 and ratchet wheel 21 and hence to the 75 sleeve 24' by the gear wheels 23, 24. Rotation of the sleeve 24' will move the sleeve over the screw 25 and will therefore alter the position of the bearing 9.

Secured to the centre of that side of the 80 frame 4 opposite to the shaft 6 is a clamp 30 which is fixed to the frame 4 by a screw 29 (see Fig. 5). Rotatably mounted upon clamp 30 is a nut 35 which is threaded upon a screw 36 the lower end of which rests on 85 the printing table 2 whenever the screen 4 is lowered for printing. The nut 35 is rotated by gear wheel 34 which meshes with a gear wheel 33 carried by a shaft 39 rotatably mounted in the clamp 30. Also 90 mounted on the shaft 39 is a ratchet wheel 32 which is adapted to be rotated by a pawl 31 pivotally mounted at the end of a lever 38 rotatably mounted on the shaft 39. Secured to the lever 38 are a pair of aligned and 95 opposed striker arms 41, 42 which are kept in the position as shown in Fig. 5 by a spring 43. The striker arms are placed in the track of the two strikers 44 and 45 which are pivotally mounted on opposite sides of the driving 100 lever 13 so as to cause the rotation of the striker arms 41, 42 in one direction only. Thus if the lever 13 is moved from the left to the right (as seen in Fig. 1) the striker 44 will engage the arm 41 and will move it in 105 the direction indicated by the arrow F, while the striker 45 will lift so as to allow such movement. When, on the other hand, the lever 13 is moved in the opposite direction, the striker 45 will engage the arm 42 so as 110 to move it in the direction indicated by the arrow F', while the striker 44 will lift so to allow this movement. Thus movement of the lever 13 in either direction effects clock- 115 wise rotation of the lever 38.

To adjust and equalise the amounts by which the devices of Figs. 3 and 4, and 5 and 6, respectively, lower the frame 4 there are provided ratchet coverings 46, 46' which are movable at will around the periphery of the 120 ratchet wheels 21 and 32 respectively so as to adjust the active run of the pawls 20, 31, respectively.

On the printing table 2 at least three unaligned register stops are provided, each of 125 which consists of a cylindrical member 47 freely movable vertically in a sleeve 49 fixed to the table 2. Each member 47 is provided with a very thin "mushroom" head 48 which rests on and holds the edges of the sheets of 130

the ream 3.

In operation, the ream 3 is placed on the printing table 2, care being taken that all the sheets are in contact with the members 547 and that the latter slide into their relative sleeves by gravity and that their heads 48 lie on the top sheet of the ream. The distance between the screen and the top sheet of the ream is then adjusted by turning the screws 1025 and 36. The first sheet is printed by driving the squeegee 15 across the screen by means of the lever 13, for instance from the left to the right. During this movement the striker 44 will turn the arm 41 so as to lower 15 the clamp 30 and consequently the front of the screen 4 by an amount which, by appropriate adjustment of the covering 46', may be made equal to the thickness of the sheet. When the squeegee is at the end of its 20 travel, the lever 13 is lifted by the arm 14 and in consequence the screen 4 also lifts to facilitate the removal of the printed sheet. This is effected by raising an edge of the printed sheet and pulling it quickly so that 25 the considerable friction between the remaining sheets as well as the pressure of the "mushroom" head of the register stops 47 along the edges of the sheets, leaves the other sheets perfectly adjusted without any displacement thereof. In the meantime, the raising and lowering of the screen 4 lowers the bearings 9 through a distance which, by appropriate adjustment of the covering 46, may be made equal to the thickness of the 35 sheet. In consequence, when the screen is lowered for the printing of the next sheet, the distance between stencil and sheet will be the same as in the case of the first sheet and the printing will be carried out in the same manner until the ream is exhausted.

It will be appreciated that the ratchet wheels 21, 32, the pawls 20, 31 and the ratchet coverings 46, 46' are provided to ensure that the screen is lowered through a 45 predetermined distance only for each printing operation. In addition, the ratchet wheel 21 and pawl 20 ensure that the shaft 22 is moved in one direction only (i.e., the direction required for lowering the bearing 9) upon the 50 rotation of the shaft 6 in opposite angular senses consequent upon angular raising and lowering of the screen.

What we claim is:—

1. Silk-screen printing machine comprising 55 a printing table, screen-support means mounted above said table, a screen carried by said screen-support means and mounted for angular movement towards and away from said table, and means, operated upon 60 angular movement of the screen, for moving the screen-support means and table relatively towards each other through a predetermined distance.

2. Machine as claimed in Claim 1 comprising a device adapted to support a part of

the screen remote from a portion or portions thereof which is or are supported by the screen-support means, the device being adapted to effect movement of the said part and the table relatively towards each other, 70 through the said predetermined distance, upon movement of a squeegee carrying member across said screen.

3. Machine as claimed in Claim 1 or 2 in which the screen-support means comprises a 75 shaft whose ends are journaled in bearings between which and the table the said relative movement may be effected, a portion or portions of said screen being connected to the said shaft, whereby angular movement of the 80 screen may be effected by rotating the shaft in its bearings.

4. Machine as claimed in Claim 3 comprising means actuated by rotation of the shaft in one direction only, for lowering the 85 bearings towards the table.

5. Machine as claimed in Claim 4 in which each bearing is carried by a rotatable member threaded onto a screw supported by and upstanding from a support upon which the 90 table is mounted, there being provided a pawl carried by a pivotally mounted lever, a driving connection between the shaft and the lever effecting pivotal movement of the latter upon rotation of the shaft, a rotatable 95 mounted ratchet wheel in engagement with the pawl, and means for transmitting motion from the ratchet wheel to the rotatable member, whereby the latter is lowered towards the support upon rotation of the shaft in one 100 angular direction only.

6. Machine as claimed in Claim 5 in which the said driving connection is an arm secured to the shaft and engaging a fork forming part of or secured to the pivotally mounted lever. 105

7. Machine as claimed in any of Claims 2-6 in which the said device comprises a screw adapted to be supported by and to upstand from the printing table when the screen is in its lowest angular position, a rotatable 110 member carried by a screen support and threaded onto the screw, and means, actuated by movement of the squeegee-carrying member, for rotating the rotatable member in one direction only. 115

8. Machine as claimed in Claim 7 comprising a pivoted member having a pair of striker arms, a pair of strikers carried by the squeegee-carrying member, one of the strikers being adapted to strike its respective arm so 120 as to rotate the pivoted member in the course of movement of the squeegee in one direction and the other striker being adapted to strike the other arm during movement of the squeegee in the opposite direction, a pawl 125 carried by the pivoted member, a rotatable ratchet wheel engaged by the pawl, and means for transmitting motion from the ratchet wheel to the rotatable member carried by the screen support. 130

9. Silk-screen printing machine substantially as described with reference to and as shown in the accompanying drawings.

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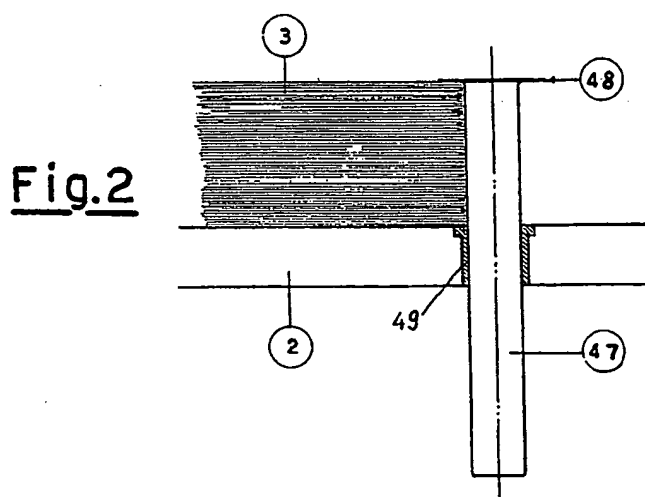
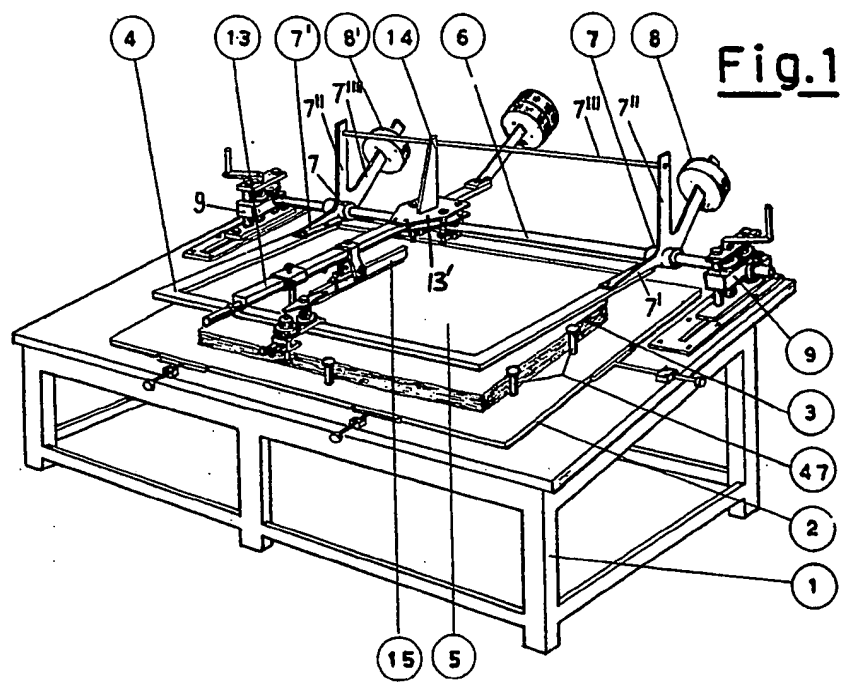


Fig.1

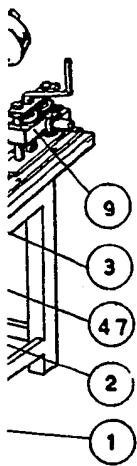


Fig.3

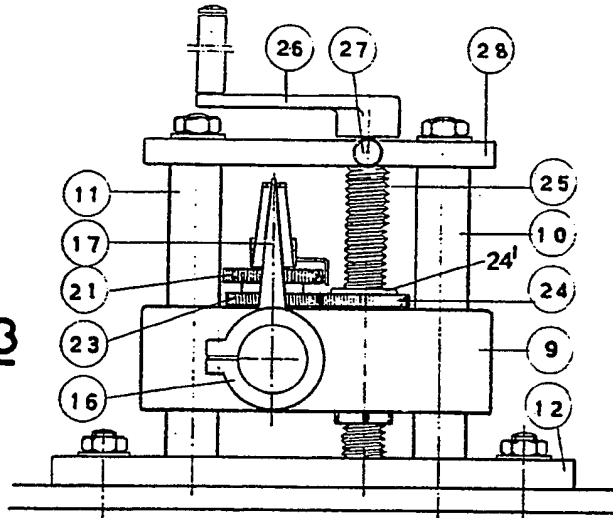


Fig.4

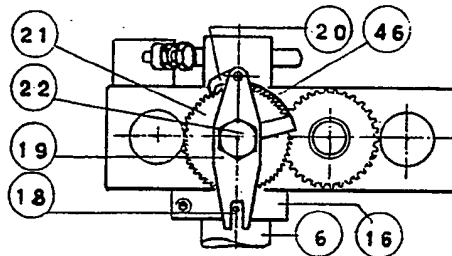


Fig.5

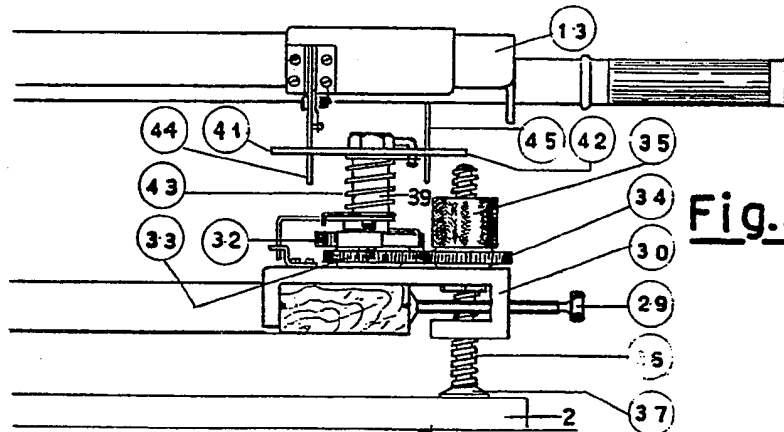
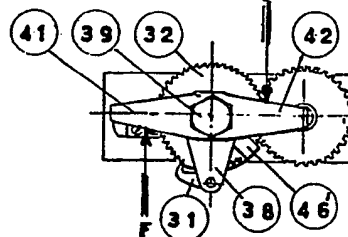
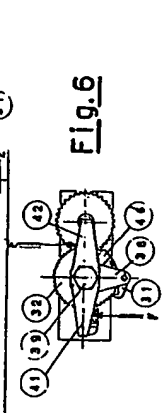
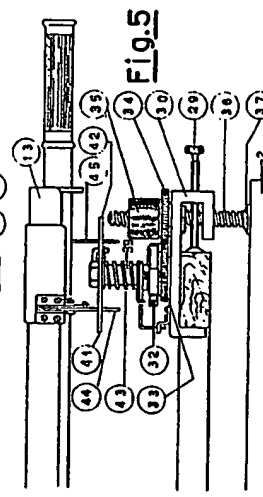
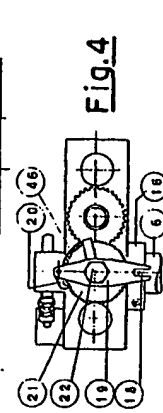
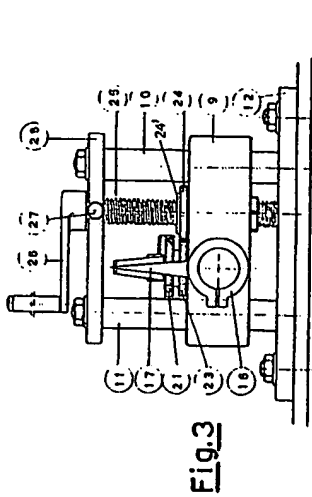
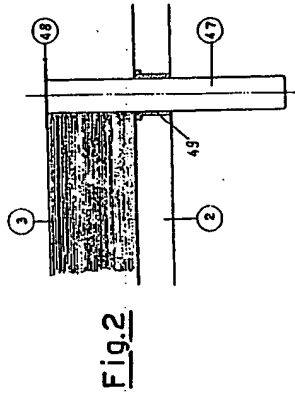
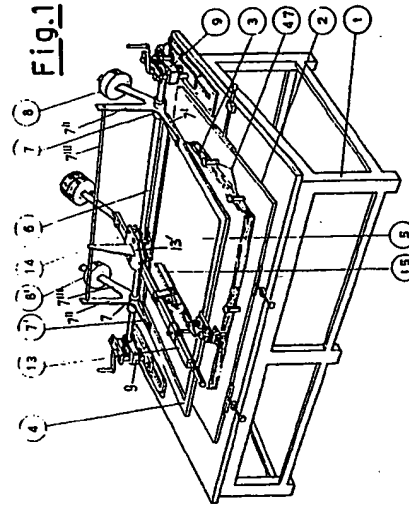


Fig.6





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